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(71) Applicant (*for all contracting nations except the United States*): Henkel KgA (Germany / Germany), D-40191 Düsseldorf (Germany)

(72) Inventor; and
(75) Inventor/ Applicant (*only for the United States*): Udo Hees (Germany / Germany), Saarnerstrasse 27, D-47269 Duisburg (Germany); Peter Daute (Germany / Germany), Adolf Butenandt Strasse 25 a, D-27616 Beverstedt (Germany); Alfred Westfechtel (Germany / Germany), Rotdomweg 7, D-40723 Hilden (Germany)

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(54) Title: Use of Dimeric Alcohol and Trimeric Alcohol Alkoxylates as Thickeners

(57) Abstract

The invention concerns the use of dimeric alcohol and/or trimeric alcohol alkoxylates as thickeners for aqueous surfactents. The dimeric alcohol and trimeric alcohol alkoxylates have both detergent and thickening properties. They are used in particular in detergents and cleaning agents as well as in hair and body-care agents.

Use of Dimeric Alcohol and Trimeric Alcohol Alkoxylates as Thickeners

Scope of the Invention

The present invention relates to the use of dimeric and trimeric alcohol alkoxylates as thickeners for aqueous surfactants or surface-active agents. This invention also relates to the use of dimeric and trimeric alcohol alkoxylates as thickeners in detergents and cleaning agents containing anionic and/or nonionic surfactants.

State of the Art

Thickeners are usually organic high-molecular-weight substances which absorb liquids, usually water, and swell in the process. They are then converted to a viscous solution, either a true solution or a colloidal solution, and they thicken the liquid, solution or emulsion to which they have been added. These thickeners are often added to emulsions to increase the viscosity of the external phase (usually the aqueous phase), while at the same time achieving an increase in stability of the emulsion. They are added to a number of industrial, cosmetic, pharmaceutical and dietetic preparations such as creams, cleaning agents, finishes, printing inks, paint dispersions, adhesives, puddings, weight loss products and the like.

Examples of thickeners include those of plant origin such as agar, gum arabic, alginic acids, dextrin, starch and starch derivatives as well as pectins or thickeners of animal origin such as gelatins, albumins and casein, synthetic products such as polyacrylic and polyvinyl compounds and inorganic compounds such as polysilicic acids and clay minerals.

What the above-mentioned thickeners have in common is that they usually do not have any other active properties than the thickening or gelling property. This is an advantage first because they do not have a negative influence on the effect of the agents to which they are added, Thus, the thickeners added to food products do not have any nutritional value and do not have an inherent taste. In other fields, however, it is advantageous if the additives used support the effect of the agents or make an active contribution.

In the production of cleaning agents, for example, it is desirable to keep the amount of additives which do not make any active contribution to the cleaning effect as small as possible. Preparations having multiple functions are especially desirable.

The object of the present invention was to make available an agent which would be suitable as a thickener in surfactants and would at the same time have detergent properties.

Description of the Invention

The object of the present invention is the use of dimeric and/or trimeric alcohol alkoxylate as thickeners for aqueous surfactants.

It has surprisingly been found that dimeric and trimeric alcohol alkoxylates have a thickening effect in surfactants while at the same time also having detergent properties.

Surfactants or surface-active agents are understood to include in particular detergents, cleaning agents and dishwashing agents as well as agents for hair care and skin care.

Dimeric and Trimeric Alcohol Alkoxylates

Dimeric alcohols are commercially available compounds and they can be obtained, for example, by reducing dimeric fatty acid esters. Similarly, trimeric alcohols can be synthesized from the trimeric fatty acid esters (see P. Daute et al., Fat. Sci. Technol. 95, (1993), p. 91 ff). Dimeric and trimeric fatty acids themselves can be obtained, for example, by oligomerization of unsaturated fatty acids. The dimeric and trimeric fatty acids are usually mixtures of cyclic and acyclic dicarboxylic acids with an average of 36 to 44 carbon atoms (see, for example, A. Hinze in Fette & Öle, 26 (1994)).

The dimeric and trimeric alcohol alkoxylates can be obtained in a known way from the dimeric and trimeric alcohols by alkoxylation. Dimeric alcohols with an average of 36 to 44 carbon atoms or trimeric alcohols with an average of 54 to 66 carbon atoms are preferred here. Preferred alkoxylates include, for example, ethoxylates and propoxylates or adducts containing both ethoxy and propoxy groups in the molecule. Adducts with an average of 1 to 20 mol of ethylene oxide per mol of technical grade dimeric and/or trimeric alcohol mixture are especially preferred and may optionally also contain an average of 1 to 5 mol propylene oxide per mol alcohol. The stated degrees of alkoxylation represents statistical averages which may be an integer or a fraction in the case of a specific product. Preferred dimeric and trimeric alcohol alkoxylates have a narrow homolog distribution (narrow range ethoxylates, NRE).

If the dimeric and trimeric alcohol alkoxylates are used as thickeners in detergents, cleaning agents and dishwashing products, these agents will preferably also contain other anionic and/or nonionic surfactants. The effect of the surfactants contained in the preparations is supported by the dimeric and trimeric alcohol alkoxylates.

Anionic and Nonionic Surfactants

Typical examples of anionic surfactants include alkylbenzene sulfonates, alkane sulfonates, olefin sulfonates, alkyl ether sulfonates, glycerine ether sulfonates, α-methyl ester sulfonates, sulfo fatty acids, alkyl sulfates, fatty alcohol ether sulfates, glycerine ether sulfates, hydroxy mixed ether sulfates, monoglyceride (ether) sulfates, fatty acid amide (ether) sulfates, sulfo-succinates, sulfo-succinamates, sulfo-triglycerides, amide soaps, ether carboxylic acids, isethionates, sarcosinates, taurides, alkyl oligoglycocide sulfates and alkyl (ether) phosphates. If the anionic surfactants contain polyglycol ethers, they may have a conventional homolog distribution, but they preferably have a narrow range distribution.

Typical examples of nonionic surfactants include fatty alcohol, polyglycol ethers, alkylphenyl polyglycol ethers, fatty acid polyglycol esters, fatty acid amide, polyglycol ethers, fatty amine polyglycol ethers, alkoxylated triglycerides, alk(ene)yl oligoglycosides, fatty acid glucamides, polyol fatty acid esters, sugar esters, sorbitan esters and polysorbates. If the nonionic surfactants contain polyglycol ether chains, they may have a conventional homolog distribution, but they will preferably have a narrow range distribution.

In order to achieve a satisfactory thickening effect and optionally a detergent effect at the same time when using dimeric and/or trimeric alcohol alkoxylates, the substances are preferably used in an amount of 0.1 to 30 percent by weight, especially 1 to 10 percent by weight, based on the detergent and cleaning agent.

The following examples are presented to illustrate the object of this invention in greater detail although it is not limited by them.

Examples

The formulations given in Table 1 below have been tested for their detergent activity and their thickening effect. These formulations each contain 10 wt% active substance. It has been found that the formulations according to this invention have a much higher viscosity in comparison with the formulations containing only the surfactant, and at the same time they have a higher active detergency power.

Table 1

Component	1	2	3
C_{61}-dimeric diol x 50 EO groups per OH group	10	6	0
Texapon® LS[1]	0	4	10
Sokalan DCS	2	2	2
Polyethylene glycol (mol. wt. 600,000)	0.1	0.1	0.1
Properties			
Active detergency[1] (relative)	53.2	65.4	67.9
Concentration (relative)	129	88.7	84.7
Viscosity[2] (mPas)	25	6102	4
Appearance[3]	a/e/h	c/e/h	a/d/f

1. The test method described below according to the journal "Seifen-Öle-Fette-Wachse," vol. 112, p. 371 (1986) was used to test the cleaning power. According to this method, the cleaning agent to be tested was applied to an artificially soiled plastic surface in the form of a 1 wt% aqueous solution (10 g/L). A mixture of carbon black, machine oil, triglycerides of saturated fatty acids and low boiling aliphatic hydrocarbons was used as the artificial soil for the dilute application of the cleaning agent. The test surface of 26 x 28 cm was coated uniformly with 2 g of the synthetic soil by using a surface coater.

   A plastic sponge was impregnated with 10 mL of the 1% cleaning solution to be tested and then was moved mechanically on the test surface which was coated with soil and to which had also been applied 10 mL of the 1% cleaning solution to be tested. After 10 wiping motions, the cleaned test surface was held under running water and the loose soiling was removed. The cleaning effect of the plastic surface cleaned in this way was determined with the help of a "Microcolor" remission color measuring device (Dr. B. Lange). The measurement quantity here is the degree of whiteness, using a clean white plastic surface as the white standard. The degree of whiteness of the clean white plastic surface corresponded to 100% RV (cleaning power). The degree of whiteness of a soiled and then cleaned plastic surface thus would correspond to a value between 0% and 100% RV. The RV values each represent the average of three determinations.

The measured values were related to the cleaning result achieved with a high-power all purpose cleaner used as the standard.

Measured value of the sample x 100 ÷ measured value of the standard = % RV relative

The high power formulation used as the standard had the following composition:

8%	alkyl benzene sulfonate sodium salt
2%	adduct of C_{12}-C_{14}-alkyl epoxide + ethylene glycol + 10 mol ethylene oxide
2%	sodium gluconate
0.1%	polyethylene glycol with a molecular weight of approximately 6,000,000, Polyox WSR 205 from UCC)

2 The viscosity was determined with a Höppler falling ball viscometer at 20°C.

3 The appearance of the surfactant solutions was evaluated as follows:

Viscosity	Color	Stability
a) low viscosity b) viscous c) gelatinous	d) colorless e) colored	f) clear g) slightly cloudy h) milky cloudy i) 2-phase system j) with sediment (solids) k) with suspended particulate matter (solids)

Patent Claims

1. Use of dimeric and/or trimeric alcohol alkoxylates as thickeners for aqueous surfactants.

2. Use according to Claim 1, characterized in that the surfactants contain anionic and/or nonionic surfactants.

3. Use according to one of Claims 1 or 2, characterized in that dimeric alcohols with an average of 36 to 44 carbon atoms or trimeric alcohols with an average of 54 to 66 carbon atoms are used.

4. Use according to one of Claims 1 through 3, characterized in that adducts of ethoxylates with an average of 1 to 20 mol ethylene oxide per mol technical grade dimeric and/or trimeric alcohol mixture are used as the dimeric and/or trimeric alcohol alkoxylates.

5. Use according to one of Claims 1 through 4, characterized in that the dimeric and/or trimeric alcohol alkoxylates are added to the surface active agents in an amount of 0.1 to 30 wt% based on the agent.